

# PATENT SPECIFICATION

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## DRAWINGS ATTACHED

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## (54) WORK CYLINDER FOR PNEUMATIC OR HYDRAULIC PRESSURE MEDIA

(71) We, **FESTO-MASCHINEN-FABRIK GOTTlieb STOLL**, a German Company of Ulmer-Strasse 48, Esslingen am Neckar, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to a work piston-and-cylinder device actuated by hydraulic or pneumatic pressure-media.

15 An object of the present invention is to provide a work piston-and-cylinder device which is relatively simple in construction and permits various opportunities of attachment.

20 According to the present invention there is provided a work piston-and-cylinder device actuated by hydraulic or pneumatic pressure media, comprising a cylinder and a piston movable in said cylinder, the piston having a piston rod projecting out of one end of the cylinder, the cylinder having at each axial end a part with an external thread for mounting the device to a bracket, the part at the end remote from the piston rod being integral with the cylinder, while the other part is provided on a closure member for the cylinder.

30 The device according to the invention can be manufactured with relatively small technical outlay, and can be installed by means of various methods of attachment so that the number of models of the device can be reduced.

35 Embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:—

40 Fig. 1 is a longitudinal sectional view along the axis of a device according to the invention;

45 Fig. 2 is a plan view of the device according to Fig. 1, the device being shown mounted in a holder at each axial end;

Fig. 3 is a side view of the device according to Fig. 1, shown mounted in another way;

Fig. 4 is a plan view of a mounting bracket in the form of a yoke for a device according to the invention;

Fig. 5 is a side view partly shown in section of the device according to Fig. 1 held by means of angled brackets on associated support parts;

Fig. 6 is a side view of an angled bracket shown in the arrangement according to Fig. 5;

Fig. 7 shows the angled bracket according to Fig. 6 in a section along line A—B in Fig. 6;

Fig. 8 is a plan view of the angled bracket according to Fig. 6; and

Fig. 9 is a side view partly shown in section, of a portion of a device according to the invention, the device being shown held in another manner by the angled bracket.

In Fig. 1 is shown a work piston-and-cylinder device 1 which can be actuated by pneumatic or hydraulic pressure media, consisting of a hollow cylinder 2 and a piston 5, and a piston rod 6 projecting axially out of one end of said cylinder, said piston rod being provided at its outer end with an external screw thread 7. At its axial ends, the cylinder has parts 9, 10 having external threads 11, 12, respectively, which serve to attach the device 1 to a holder or the like. The parts 9, 10 are each designed as a tube fixture, having holes 13 and 14, respectively, running in the direction of the device's longitudinal medial axis, said holes 13, 14 communicating with the interior of the cylinder 2. A closure member or cover 4 is penetrated by the piston rod 6, and provided with sealing means 15, 16 guiding said piston rod 6; it includes the outer part 10, an annular collar 21 having substantially the external diameter of the cylinder 2, and an adjoining inner tube fixture 22 (Fig. 1) received into the interior of the cylinder 2. The axial termination of the cylinder 2 at its other end is formed by the

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part 9 having a smaller outer diameter than the cylinder, said part 9 containing a hole 17 through which the pressure medium is introduced according to arrow 18 into the cylinder's interior, or drawn out of it according to arrow 19. The hole 17 is internally threaded at 20 and serves as a screw connection for a pressure medium pipeline, not shown in further detail.

The cylinder 2 itself is made from a seamless drawn tube, with which a closure 3 forms with its narrower part 9 a unit of the same material and is shaped, e.g. by upsetting.

The device 1 shown in Fig. 1 has a double-acting piston 5. In this construction the closure member 4 has, in the annular integral collar 21, a radial threaded hole 23, running more or less perpendicular to the device's longitudinal medial axis 8, and communicating with the interior of the cylinder 2 to form a feed- or outlet-pipe for pressure medium, through which the pressure medium is fed, according to arrow 24, into the cylinder's interior, or withdrawn from it, according to arrow 25.

A fixture yoke 26, serving to hold the device 1, is associated with the closure member 4 (Figs. 2-4), one end of said yoke being set on the collar 21 to pivot around an axis running more or less at right angles to the device's longitudinal medial axis 8 and to the radial threaded hole 23. The other end of the yoke 26 includes a support surface 27 (see Fig. 3), running at a distance from the outer wall of cylinder 2, and in a plane parallel to the pivotal axis of the yoke, said support surface extending on both sides of the cylinder's longitudinal medial axis 8. The yoke 26 is releasably fixed on the support 21 by means of screws 28. The yoke 26 is U-shaped, with two parallel legs 30, 31 connected by a crosspiece 29, the distance between said legs substantially corresponding to the outer diameter of the cylinder 2.

As is seen in Fig. 3, the parallel legs 30, 31 of the U-shaped yoke 26 extend obliquely, on their side facing away from the cylinder 2, away from the cross piece 29 towards the pivotal axis, in such a way that the legs 30, 31 taper towards the pivotal axis.

Figs. 2 and 3 also show that the work piston-and-cylinder 1 can be attached at either one end or both ends by means of parts 9, 10 located in corresponding holes in a holder, said holes running in the direction of the device's longitudinal medial axis 8. In Fig. 2 the holder comprises two substantially parallel walls 32a, 32b having holes 34, 35 respectively, whose diameter in each case is slightly larger than the outer diameter of the parts 9, 10. The device 1 is attached by means of nuts 36, 37, and nut 38, screwed on to parts 10 and 9 respectively, and also

by means of the yoke 26. In Fig. 3, the work-cylinder 2 is fixed by the part 9 and the U-shaped yoke 26 to the vertical wall 33a and a horizontal baseplate 33b. The cylinder 2 is fixed at its right-hand end by screwing the part 9, with the external thread 11, into a threaded hole 39 of the wall 33a and on its left-hand end by positioning the support-surface 27 of the yoke 26 on the baseplate 33b and by screwing the cross-piece 29 to this baseplate 33b. For this purpose the crosspiece 29 is provided with four holes 40, as Fig. 4 shows.

In a further development of the invention, an angled bracket 41 (Figs. 6 to 8) is associated with the part 9 or the part 10, one leg of said bracket 41 running at right angles to the device's longitudinal medial axis 8, and having a hole 43 to house one of the parts 9, 10, the other leg 44 running substantially at right angles thereto, running on both sides of the device's longitudinal medial axis 8 at a radial distance from the outer wall of the cylinder 2, and having holes 45 through which fixing means, e.g. screws, can be passed, so as to engage with a support 46 or 47.

Fig. 5 shows a fixture for the device 1 comprising two angled brackets 48 and 49 which are similar in design to the angled bracket 41, and which serve as support feet for the cylinder 2. The angled brackets 48, 49 are fixed on the parts 9, 10 by means of nuts 50, 51 and are screwed to the supports 46, 47. It can be seen that the angled holders can be arranged with the lower leg pointing either towards or away from the device 1, as shown on one hand in the bracket 49 and on the other in the bracket 48. In the same way, the angled brackets can also be fixed on a vertical or oblique wall or the like, or also suspended from a ceiling so that many varied fixture means for device 1 are possible and these can be combined with the possibilities already described.

As shown particularly by Fig. 6, the leg 42 of the angled bracket 41 containing the large hole 43 has smaller through holes 52, in the corner regions, for fixing the angled bracket 41 to a support 53 (Fig. 9) which is in a plane at right angles to the device's longitudinal medial axis 8, this leg 42 of the bracket 41 serving either as a support (Fig. 5) or as a fixture flange (Fig. 9) depending on how it is used. In the construction shown in Fig. 9 the angled bracket 41 is fixed to the support 53 by means of screws 54 and nuts 55 passed through the holes 52 in the angled bracket and through the support 53. The device 1 is in turn held with its part 10 in the large hole 43 of the angled bracket 41, and is connected to the latter by a nut 56.

According to a further development of the invention, means for damping the impact of the piston 5 with the closures 3, 4 are asso-

ciated with the piston 5 and/or the cylinder 2 at the ends 3, 4 (Fig. 1). These means for damping may be carried by the piston 5. Fig. 1 shows that these damping means can be provided on both piston surfaces and consist, respectively, of resilient rings 57, 58 which when released are substantially rectangular in cross-section. The rings 57, 58 are respectively housed in annular grooves 59, 60 incised in the piston 5, the outer flanks 61, 62 of said grooves tapering towards each other so that the groove is trapezoidal in cross section. The rings 57, 58 can consist of plastics, rubber or similar resilient materials. When hydraulic pressure-media are used, the rings 57, 58 may be made from oil-resistant materials.

#### WHAT WE CLAIM IS:—

1. A work piston-and-cylinder device actuated by hydraulic or pneumatic pressure-media, comprising a cylinder and a piston movable in said cylinder, the piston having a piston rod projecting out of one end of the cylinder, the cylinder having at each axial end an externally-threaded part for mounting the device to a bracket, the part at the end remote from the piston rod being integral with the cylinder, while the other part is provided on a closure member for the cylinder.

2. A device according to claim 1, wherein a hole in the part at the end remote from the piston rod, has an internal thread and serves as a screw connection for a pressure-medium pipe.

3. A device according to claim 1 or 2, wherein the closure member has an annular collar adjoining its external thread and connected to the end of the cylinder, said collar having substantially the same diameter as the cylinder, and the closure member having an inner tube fixture adjoining the collar and received within the cylinder.

4. A device according to any one of claims 1 to 3, wherein the cylinder is made from a seamless drawn tube.

5. A device according to any one of claims 1 to 4 wherein the piston carries, on at least one side, resilient means for damping impact between the piston and the cylinder ends.

6. A device as claimed in any one of claims 1 to 5 having a yoke serving to attach the closure member end of the device to a holder, the yoke being attached to the closure member so as to pivot around an axis at right angles to the device's longitudinal medial axis and having a support surface which extends at a distance from the device's outer wall, and parallel to the pivotal axis, said support

surface extending on both sides of the device's longitudinal medial axis.

7. A device as claimed in claim 6 wherein the yoke is U-shaped, having two parallel legs whose distance apart substantially corresponds to the outer diameter of the cylinder and which are connected by a crosspiece which is provided with holes for attaching the yoke to a support.

8. A device as claimed in any one of claims 1 to 5, wherein an angled bracket is associated with at least one of the externally threaded parts, a first leg of which bracket is at right angles to the device's longitudinal medial axis and is provided with a large hole serving to house one of the externally threaded parts, and the other leg of which bracket extends substantially at right angles to the first leg at a radial distance from the outer wall of the cylinder, and is provided with holes through which means may be inserted for fixing the bracket to a support.

9. A device as claimed in claim 8, wherein the first leg of the angled bracket has additional smaller holes through which means may be inserted for fixing the bracket to a support.

10. A work piston-and-cylinder device actuated by hydraulic or pneumatic pressure-media, substantially as hereinbefore described with reference to Fig. 1 of the accompanying drawings.

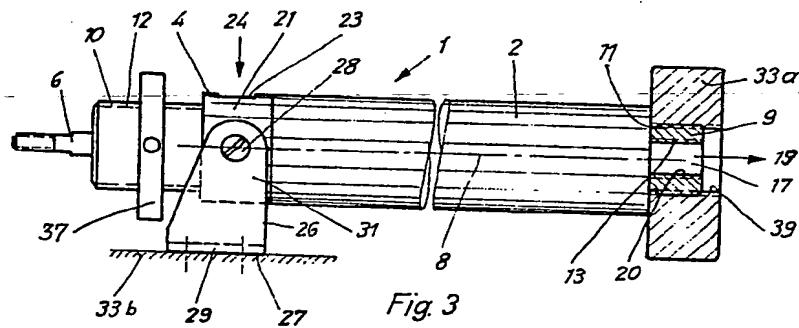
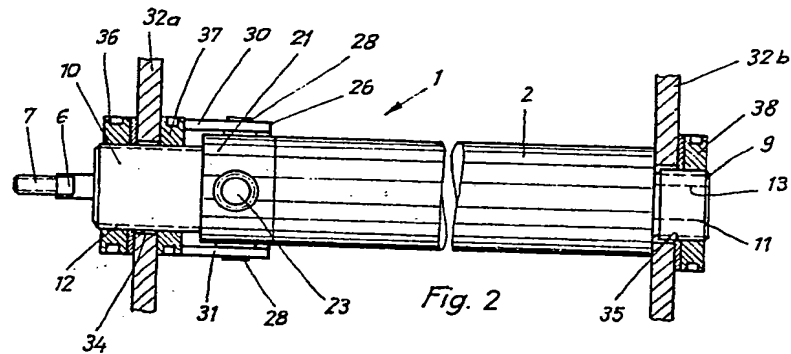
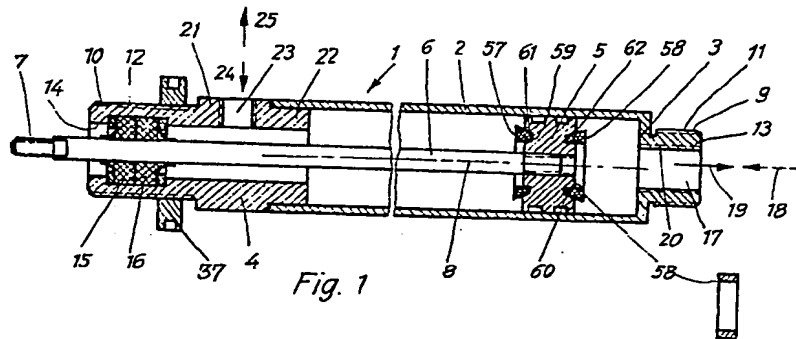
11. A work piston-and-cylinder device actuated by hydraulic or pneumatic pressure-media, having mounting brackets substantially as hereinbefore described with reference to Figs. 2 and 4 of the accompanying drawings.

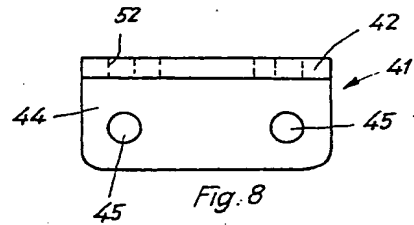
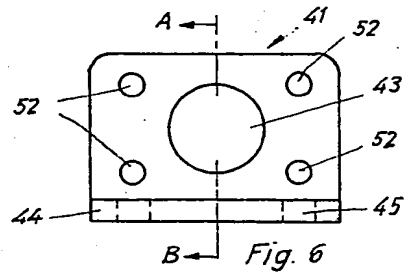
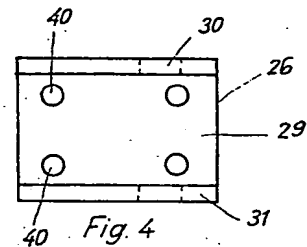
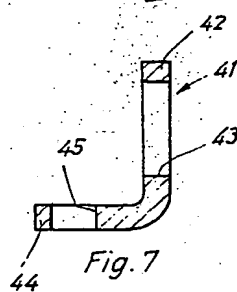
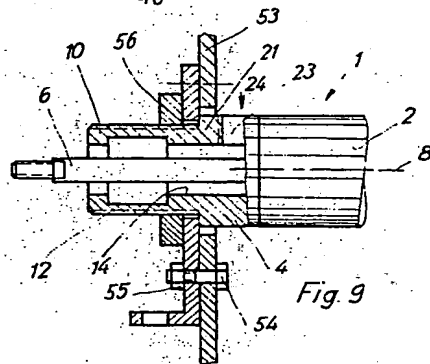
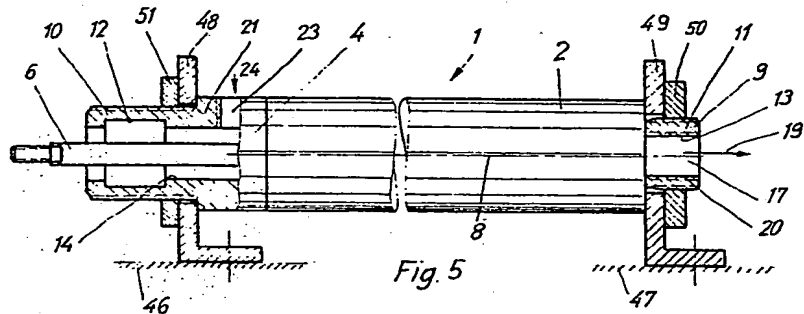
12. A work piston-and-cylinder device actuated by hydraulic or pneumatic pressure-media, having mounting brackets substantially as hereinbefore described with reference to Figs. 3 and 4 of the accompanying drawings.

13. A work piston-and-cylinder device actuated by hydraulic or pneumatic pressure-media, having mounting brackets substantially as hereinbefore described with reference to Figs. 5 to 9 of the accompanying drawings.

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